

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over NPL "Proposal of OFDMA System with Adaptive Subchannel and Bit Allocation Technique" to Yuanrun Teng et al. ("Teng") in view of U.S. PG Publication No. 2001/0024427 A1 to Suzuki et al. ("Suzuki").

3. As to **claim 1**, Teng discloses a multicarrier transmitting apparatus performing a radio communication by use of a plurality of frequencies, the multicarrier apparatus comprising:

a calculation section that calculates the number of users available for each subcarrier (Teng teaches a variable W, which is a set of available users for subcarriers, therefore there is functionality to calculate the number of available users (page 85, last paragraph).

a selection section that selects a subcarrier having the small number of the available users based on a calculation result by the calculation section (Teng et al. page

85, Fig. 3 discloses an algorithm where in box 5, a subchannel ( $V_k$ ) with the least number of available users ( $k$ ) is searched first from a set of available subchannels  $V$ ;

and an allocation section that allocates the subcarrier, selected by the selection section, to a user showing good channel quality among the users included in the number of the available users, who are the objects to whom the subcarriers are to be allocated (Teng et al. page 85, Fig. 3 discloses an algorithm where in box 10, a subchannel ( $s$ ) from a set of available subcarriers ( $W$ ) is allocated to a user ( $k$ )).

Teng does not expressly disclose a receiving section that receives channel quality information from a receiving apparatus of each user and Teng does not expressly disclose that determining an available user is based on a channel quality indicator.

Suzuki discloses a base station that is able to receive channel quality information from a radio terminal station; therefore the base station must have a receiving section - page 2, paragraph 17 and Suzuki also discloses there is some threshold for channel quality which will allow for high quality radio transmission which will determine if a user is available to utilize a subcarrier. If the user does not satisfy a threshold, that user will not be available to a subcarrier (page 3, paragraph 50-51).

At the time of invention, it would have been obvious to a person of ordinary skilled in the art to include a receiving section for receiving channel quality information and to calculate the number of users of available for each subcarrier based on channel quality information. The suggestion/motivation would have been to increase transmission efficiency in a wireless communication

environment by using channel quality information (Suzuki – page 1 and 2, paragraph 16).

4. As to **claim 2**, Teng discloses a multicarrier transmitting apparatus as to the parent claim.

Teng does not expressly disclose wherein the allocation section sets required quality of each of the users based on the channel quality information and allocates the subcarrier selected by the selection section to a user whose channel quality satisfies the required quality among the users included in the number of the available users who are the objects to whom the subcarriers are to be allocated

Suzuki discloses that there is a threshold for channel quality which will allow for high quality radio transmission which will determine if a user is available to utilize a subcarrier (Suzuki - page 3, paragraph 50-51),

Suzuki teaches that subcarriers that provide poor receiving conditions will not be allocated to a user; therefore among the available subcarriers, an optimal subcarrier will be selected (page 4, paragraph 16-17).

At the time of invention, it would have been obvious to a person of ordinary skilled in the art to allocate a subcarrier to a user showing good channel quality satisfies among the available users. The suggestion/motivation would have been increase transmission efficiency in a wireless communication environment by using channel quality information (Suzuki – page 1 and 2, paragraph 16).

5. As to **claim 3**, Teng teaches a multicarrier transmitting apparatus as to the parent claim where subcarrier allocations will not be complete until all users have received an allocation (Teng shows the algorithm will continue to loop until V, which is the set of available subchannels, is empty, meaning that all users have received an allocation (page 85, Fig. 3, box 6)).

Teng does not expressly disclose wherein the allocation section excludes the user to whom the subcarrier was allocated.

Suzuki teaches an allocation method where only one subcarrier may be assigned to only one radio terminal station, the user; therefore after an assignment is made to a radio terminal station, that station must be excluded from further subcarrier assignments (Suzuki - page 3, lines 1-2 of paragraph 42) .

At the time of invention, it would have been obvious to a person of ordinary skilled in the art to exclude the user to whom the subcarrier was allocated. The suggestion/motivation would have been increase to improve the downlink transmission efficiency in a wireless communications environment (Suzuki – page 2, paragraph 19).

6. As to **claim 4**, Teng discloses a multicarrier receiving apparatus performing a radio communication with the multicarrier transmitting apparatus as to the parent claim.

Teng does not expressly disclose the multicarrier receiving apparatus comprising: an estimation section that estimates channel quality information related to

channel quality of each subcarrier and a transmitting section that transmits the channel quality information estimated by the estimation section

Suzuki teaches a radio terminal station will report channel quality information of each subcarrier to a base station therefore the radio terminal station has functionality to estimate channel quality information (page 3, paragraph 50) and Suzuki also teaches that a radio terminal station can transmit channel quality information to a base station, therefore the radio terminal has functionality to transmit channel quality information (Suzuki - page 3, paragraph 41);

At the time of invention, it would have been obvious to a person of ordinary skilled in the art to include a receiving apparatus performing a radio communication with the multicarrier transmitting apparatus. The suggestion/motivation would have been for communicating with a base station and returning channel quality information to the base station (page 3, paragraph 40 and 41).

7. As to **claim 5**, see similar rejection to claim 1.
8. As to **claim 6**, see similar rejection to claim 4.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL MITCHELL whose telephone number is (571)270-5307. The examiner can normally be reached on Monday - Friday 8:00 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lao Lun-yi can be reached on 571-272-7671. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. M./  
Examiner, Art Unit 4134

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Supervisory Patent Examiner, Art Unit 4134